SILICON LABS

Mixed-Signal 8-bit Microcontrollers

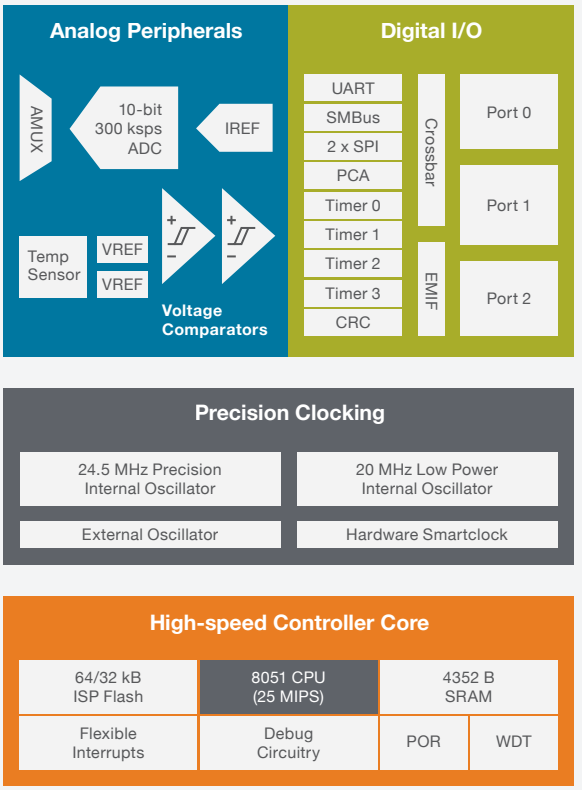
2014 PRODUCT SELECTOR GUIDE

8

8-bit MCUs

Fast, low-power solutions featuring fully-integrated analog functionality and peripherals

The 8051 family architecture has the largest existing ecosystem, representing nearly a quarter of the MCU market



Analog Intensive

Up to 100 MHz operation

12-bit, 16-bit and 24-bit ADCs available

16 x 16 MAC options

Automotive/Industrial

CAN 2.0 and LIN 2.1 available

-40 to 125 °C operation

All devices automotive qualified

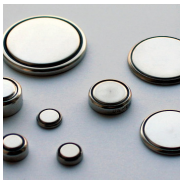
Broad Based

Internal 2 % accurate oscillator — all devices

±2 °C temperature sensing available

EEPROM options

Capacitive sense available

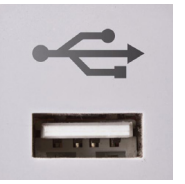


Low Power

DC-DC buck and boost converter options

Capacitive sense available

Ultra-low sleep current/fast wake up times



USB

Free software libraries

5 V regulator

Crystal-less operation

Select a secure architecture

The C8051 is based on a Harvard architecture, allowing it to only execute code fetched from program memory, and allows locking of program memory to prevent unauthorized examination. These are two advantages in the C8051 hardware that protects a product from security attacks.

Select a low latency system

Variations in interrupt response time can cause adverse effects in some applications, causing, for example, audio distortion or motor noise and vibration. With the C8051 it's easy to work "close to the metal" and have full control over the entire system.

Select a simple solution

The C8051 microcontroller is ideal for processing 8-bit data that comes from port I/O or sensors inputs. A great many applications don't require complex mathematics processing, and benefit significantly from the code density advantages of an 8-bit processor when not tasked with 16-bit or 32-bit mathematics. Human interface functions, sensor interface, and distributed processing functions are examples that easily benefit from the simplicity of the C8051 solutions.

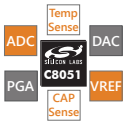
Despite strong media coverage of the rapid expansion of the ARM ecosystem, the largest ecosystem in MCUs still exists around the mature and tiny 8051 MCU architecture.

IHS, 2013

10 reasons Silicon Labs C8051 MCUs are the world's highest performance 8-bit microcontrollers

Highly Integrated MCUs

C8051 microcontrollers offer a complete set of high performance, configurable peripherals in very small packages.



High Performance Analog Peripherals

Reduce system cost and simplify designs. 8–24-bit ADCs, 12-bit DACs, comparators, PGAs, voltage references, temperature sensors and capacitive sensing.

Crystal-less Operation

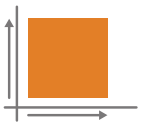
Precision internal oscillators with speeds up 50 MHz support full speed processor and peripheral operation and reduce PCB area requirements and BOM cost.

Fast and Efficient Processor Core

With up to 100 MIPS peak throughput, the C8051 microcontrollers provide an economical solution that satisfies the performance needs of embedded applications.

Fast and Efficient Digital Peripherals

Efficient peripherals reduces processor overhead and include high performance timers and PWMs for high-resolution and high-speed serial peripherals to optimize throughput.

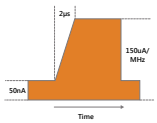


No Performance Compromises

C8051 microcontrollers provide robust oscillators, core, I/O and analog and digital peripherals with guaranteed performance over voltage and temperature range.

Highly Integrated USB

Free software libraries simplify development, and crystal-less operation, onboard voltage regulator, and internal memory reduces PCB area and BOM cost.



Ultra Low Power

Ultra low standby with brown out detection, fast wake times, and low active current along with buck and boost converter options offer long battery lifetime.

Digital Crossbar and Analog Multiplexer

Silicon Labs' patented crossbar technology enables maximum flexibility and unparalleled ease of development, allowing designers to select peripherals without pinout conflicts.

Simplicity Studio™ Software and Crossbar Configurator

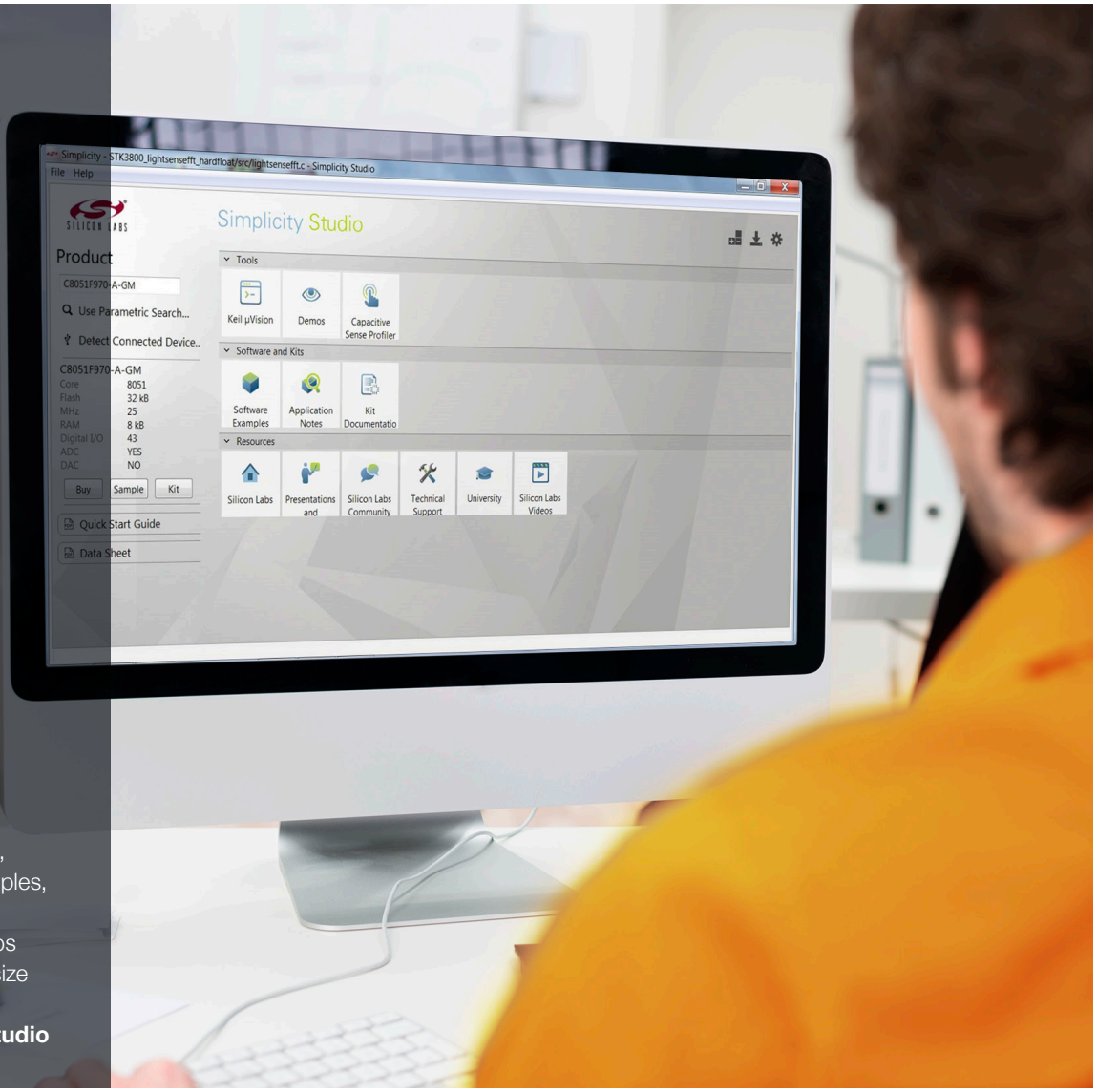
Automatic configuration code generation, free unlimited code size Keil compiler, profile tools, easily updated support packages, software and documentation, all at your finger tips.

8051	Package Type	Flash (kB)	RAM (kB)	MHz	GPIO	CAN	LIN	SPI	UART	I²C	EMIF	ADC 1	ADC 2	DAC	Comparator	Internal OSC	Timers	PCA Channels	LCD	AES	RTC	MAC (16x16)	DMA	Capacitive Sense	LFO	DC-DC
ANALOG INTENSIVE																										
C8051F00x	LQFP32	32	0.25, 2.25	20, 25	8			1	1	1		12-bit, 4-ch.		12-bit, 2-ch.	1	20%	4	5								
C8051F00x	TQFP48	32	0.25, 2.25	20, 25	16			1	1	1		12-bit, 8-ch.		12-bit, 2-ch	2	20%	4	5								
C8051F00x	TQFP64	32	0.25, 2.25	20, 25	32			1	1	1		12-bit, 8-ch.		12-bit, 2-ch	2	20%	4	5								
C8051F02x	TQFP100	64	4.25	25	64			1	2	1	Y	10/12-bit, 8-ch.	8-bit, 8-ch.	12-bit, 2-ch.	2	20%	5	5								
C8051F02x	TQFP64	64	4.25	25	32			1	2	1	Y	10/12-bit, 8-ch.	8-bit, 8-ch.	12-bit, 2-ch	2	20%	5	5								
C8051F04x	TQFP100	32, 64	4.25	25	64	1			2	1	Y	10/12-bit, 13-ch.	8-bit, 8-ch.	12-bit, 2-ch.	3	2%	5	6								
C8051F04x	TQFP64	32, 64	4.25	25	32	1			2	1	Y	10/12-bit, 13-ch.	8-bit, 8-ch.	12-bit, 2-ch	3	2%	5	6								
C8051F06x	TQFP100	32, 64	4.25	25	59	1			2	1	Y	16-bit, 1-ch.	16-bit, 1-ch.	12-bit, 2-ch.	3	2%	5	6					Y			
C8051F06x	TQFP64	32, 64	4.25	25	24	1			2	1		16-bit, 1-ch.	16-bit, 1-ch.	12-bit, 2-ch.	3	2%	5	6					Y			
C8051F12x	TQFP100	128	8	50, 100	64			1	2	1	Y	10/12-bit, 8-ch.	8-bit, 8-ch.	12-bit, 2-ch.	2	2%	5	6				Y				
C8051F12x	TQFP64	128	8	50, 100	32			1	2	1	Y	10/12-bit, 8-ch.	8-bit, 8-ch.	12-bit, 2-ch.	2	2%	5	6				Y				
C8051F13x	TQFP100	64, 128	8	100	64			1	2	1	Y	10-bit, 8-ch.			2	2%	5	6				Y				
C8051F13x	TQFP64	64, 128	8	100	32			1	2	1	Y	10-bit, 8-ch.			2	2%	5	6				Y				
C8051F35x	LQFP32	8	1	50	17			1	1	1		24-bit, 8-ch.		8-bit, 2-ch.	1	2%	4	3								
C8051F35x	QFN28	8	1	50	17			1	1	1		24-bit, 8-ch.		8-bit, 2-ch.	1	2%	4	3								
AUTOMOTIVE/INDUSTRIAL																										
C8051F50x	QFN32	32, 64	4.25	50	25	1	1	1	1	1	Y	12-bit, 25-ch.			2	0.5%	4	6								
C8051F50x	QFN40	64	4.25	50	33	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F50x	QFN48	32, 64	4.25	50	40	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F50x	QFP32	64	4.25	50	25	1	1	1	1	1	Y	12-bit, 25-ch.			2	0.5%	4	6								
C8051F50x	QFP48	32, 64	4.25	50	40	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F51x	QFP40	32	4.25	50	33	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F52x	DFN10	2, 4, 8	0.25	25	6		1	1	1			12-bit, 6-ch.			1	0.5%	3	3								
C8051F53x	QFN20	2, 4, 8	0.25	25	16		1	1	1			12-bit, 16-ch.			1	0.5%	3	3								
C8051F53x	TSSOP20	2, 4, 8	0.25	25	16		1	1	1			12-bit, 16-ch.			1	0.5%	3	3								
C8051F54x	QFN24	8, 16	1.25	50	18		1	1	1	1		12-bit, 18-ch.			2	0.5%	4	6								
C8051F54x	QFN32	8, 16	1.25	50	25		1	1	1	1		12-bit, 25-ch.			2	0.5%	4	6								
C8051F54x	QFP32	8, 16	1.25	50	25		1	1	1	1		12-bit, 25-ch.			2	0.5%	4	6								
C8051F55x	QFN24	16, 32	2.25	50	18	1	1	1	1	1		12-bit, 18-ch.			2	0.5%	4	6								
C8051F56x	QFN32	16, 32	2.25	50	25	1	1	1	1	1		12-bit, 25-ch.			2	0.5%	4	6								
C8051F56x	QFN40	16, 32	2.25	50	33	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F56x	QFP32	16, 32	2.25	50	25	1	1	1	1	1		12-bit, 25-ch.			2	0.5%	4	6								
C8051F57x	QFN40	16, 32	2.25	50	33	1	1	1	1	1	Y	12-bit, 32-ch.			2	0.5%	4	6								
C8051F58x	QFP32	96, 128	8	50	25	1	1	1	2	1		12-bit, 25-ch.			3	0.5%	6	12								
C8051F58x	QFN40	128	8	50	33	1	1	1	2	1	Y	12-bit, 32-ch.			3	0.5%	6	12								
C8051F58x	QFN48	96, 128	8	50	40	1	1	1	2	1	Y	12-bit, 32-ch.			3	0.5%	6	12								
C8051F58x	QFP32	96, 128	8	50	25	1	1	1	2	1		12-bit, 25-ch.			3	0.5%	6	12								
C8051F58x	QFP48	96, 128	8	50	40	1	1	1	2	1	Y	12-bit, 32-ch.			3	0.5%	6	12								
C8051F59x	QFN40	96	8	50	33	1	1	1	2	1	Y	12-bit, 32-ch.			3	0.5%	6	12								
USB																										
C8051F32x	LQFP32	16	2.25	25	25			1	1	1		10-bit, 17-ch.			2	1.5%	4	5								
C8051F32x	QFN28	16	2.25	25	21			1	1	1		10-bit, 13-ch.			2	1.5%	4	5								
C8051F32x	QFN28	16	1.5	25	15				1						2	1.5%	2									
C8051F34x	LQFP32	32, 64	2.25, 4.25, 5.25	50	25			1	2	1		10-bit, 21-ch.			2	1.5%	4	5								
C8051F34x	QFN32	32, 64	2.25, 4.25	50	25			1	2	1		10-bit, 21-ch.			2	1.5%	4	5								
C8051F34x	TQFP48	32, 64	2.25, 4.25, 5.25	50	40			1	2	1	Y	10-bit, 20-ch.			2	1.5%	4	5								
C8051F38x	LQFP32	16, 32, 64	2.25, 4.25	50	50			1	2	2		10-bit, 21-ch.			2	1.5%	6	5								
C8051F38x	QFN32	16, 32, 64	2.25, 4.25	50	50			1	2	2		10-bit, 21-ch.			2	1.5%	6	5								
C8051F38x	TQFP48	32, 64	2.25, 4.25	50	50			1	2	2	Y	10-bit, 32-ch.			2	1.5%	6	5								

8051	Package Type	Flash (kB)	RAM (kB)	MHz	GPIO	CAN	LIN	SPI	UART	I²C	EMIF	ADC 1	ADC 2	DAC	Comparator	Internal OSC	Timers	PCA Channels	LCD	AES	RTC	MAC (16x16)	DMA	Capacitive Sense	LFO	DC-DC
BROAD-BASED																										
C8051F30x	QFN11	2, 4, 8	0.25	25	8				1	1		8-bit, 8-ch.			1	2%	3	3								
C8051F30x	SOIC14	2, 4, 8	0.25	25	8				1	1		8-bit, 8-ch.			1	2%	3	3								
C8051F31x	LQFP32	8, 16	1.25	25	29			1	1	1		10-bit, 21-ch.			2	2%	4	5								
C8051F31x	QFN24	16	1.25	25	21			1	1	1		10-bit, 13-ch.			2	2%	4	5								
C8051F31x	QFN28	8, 16	1.25	25	25			1	1	1		10-bit, 17-ch.			2	2%	4	5								
C8051F33x	DIP20	8	0.75	25	17			1	1	1		10-bit, 16-ch.		10-bit, 1-ch.	1	2%	4	3							Y	
C8051F33x	QFN20	2, 4, 8, 16	0.75	25	17			1	1	1		10-bit, 16-ch.		10-bit, 1-ch.	1	2%	4	3							Y	
C8051F33x	QFN24	16	0.75	25	21			1	1	1		10-bit, 16-ch.		10-bit, 1-ch.	1	2%	4	3							Y	
C8051F36x	LQFP32	16, 32	1.25	50, 100	27,29			1	1	1		10-bit, 21-ch.		10-bit, 1-ch.	2	2%	4	6				Y				
C8051F36x	QFN28	16, 32	1.25	50, 100	24,25			1	1	1		10-bit, 17-ch.		10-bit, 1-ch.	2	2%	4	6				Y				
C8051F36x	TQFP48	32	1.25	100	39			1	1	1	Y	10-bit, 21-ch.		10-bit, 1-ch.	2	2%	4	6				Y				
C8051F37x	QFN24	16, 16	1	50	21			1	1	2		10-bit, 16-ch.		10-bit, 2-ch.	2	2%	6	3							Y	
C8051F39x	QFN20	4, 8, 16	1	50	17			1	1	2		10-bit, 16-ch.		10-bit, 2-ch.	1	2%	6	3							Y	
C8051F39x	QFN24	8, 16	1	50	21			1	1	2		10-bit, 16-ch.		10-bit, 2-ch.	1	2%	6	3							Y	
C8051F41x	LQFP32	16, 32	2.25	50	24			1	1	1		12-bit, 24-ch.		12-bit, 2ch.	2	2%	4	6			Y					
C8051F41x	QFN28	16, 32	2.25	50	20			1	1	1		12-bit, 20-ch.		12-bit, 2ch.	2	2%	4	6			Y					
C8051F71x	QFN48	8	0.5	25	39			1	1	1		10-bit, 12-ch.			1	2%	4	4						27		
C8051F71x	QFN48	8	0.5	25	39			1	1	1		10-bit, 12-ch.			1	2%	4	3						27		
C8051F71x	QFP64	8	0.5	25	54			1	1	1	Y	12-bit, 16-ch.			1	2%	4	3						38		
C8051F85x	QFN20	2, 4, 8	0.25, 0.5	25	16			1	1	1		12-bit, 15-ch.			2	2%	4	3							Y	
C8051F85x	QSOP24	2, 4, 8	0.25, 0.5	25	18			1	1	1		12-bit, 16-ch.			2	2%	4	3							Y	
C8051F86x	SOIC16	2, 4, 8	0.25, 0.5	25	13			1	1	1		12-bit, 12-ch.			2	2%	4	3							Y	
LOW-POWER																										
C8051F90x	QFN20	8	0.75	25	16			2	1	1		10-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F90x	QFN24	8	0.75	25	16			2	1	1		12-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F90x	QSOP24	8	0.75	25	16			2	1	1		10/12-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F91x	QFN24	16	0.75	25	16			2	1	1		10/12-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F91x	QSOP24	16	0.75	25	16			2	1	1		10-12-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F92x	LQFP32	32	4.25	25	24			2	1	1	Y	10-bit, 23-ch.			2	2%	4	6			Y					Y
C8051F92x	QFN24	32	4.25	25	16			2	1	1		10-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F92x	QFN32	32	4.25	25	24			2	1	1	Y	10-bit, 23-ch.			2	2%	4	6			Y					Y
C8051F93x	LQFP32	64	4.25	25	24			2	1	1	Y	10-bit, 23-ch.			2	2%	4	6			Y					Y
C8051F93x	QFN24	64	4.25	25	16			2	1	1		10-bit, 15-ch.			2	2%	4	6			Y					Y
C8051F93x	QFN32	64	4.25	25	24			2	1	1	Y	10-bit, 23-ch.			2	2%	4	6			Y					Y
C8051F96x	DQFN76	16, 32, 64, 128	4.25, 8	25	57			2	1	1		12-bit, 16-ch.			2	2%	4	6	128	Y	Y					Y
C8051F96x	QFN40	16, 32, 64, 128	4.25, 8	25	34			2	1	1		12-bit, 16-ch.			2	2%	4	6	36	Y	Y					Y
C8051F96x	TQFP80	16, 32, 64, 128	4.25, 8	25	57			2	1	1		12-bit, 16-ch.			2	2%	4	6	128	Y	Y					Y
C8051F97x	QFN24	16, 32	4, 8	25	19			1	1	1		10-bit, 19-ch.				2%	4	3			Y			19		Y
C8051F97x	QFN32	16, 32	4, 8	25	28			1	1	1		10-bit, 28-ch.				2%	4	3			Y			28		Y
C8051F97x	QFN48	16, 32	4, 8	25	43			1	1	1		10-bit, 43-ch.				2%	4	3			Y			43		Y
C8051F98x	QFN20	2, 4, 8	0.5	25	16			1	1	1		10/12-bit, 9-ch.			1	2%	4	3								
C8051F98x	QFN24	4, 8	0.5	25	17			1	1	1		10/12-bit, 10-ch.			1	2%	4	3								
C8051F98x	QSOP24	4, 8	0.5	25	17			1	1	1		10/12-bit, 10-ch.			1	2%	4	3								
C8051F99x	QFN20	8	0.5	25	16			1	1	1		12-bit, 9-ch.			1	2%	4	3			Y			13		
C8051F99x	QFN24	8	0.5	25	17			1	1	1		12-bit, 10-ch.			1	2%	4	3			Y			14		
C8051F99x	QSOP24	8	0.5	25	17			1	1	1		12-bit, 10-ch.			1	2%	4	3			Y			14		

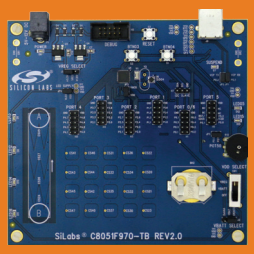
Package Options

Silicon Labs C8051 tools make development simple



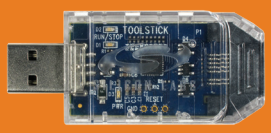
Simplicity Studio

Easy access to the Simplicity IDE, configuration tools, demos, examples, datasheets, application notes, community forum and Silicon Labs support, plus an unlimited code size Keil compiler, all free of charge.
www.silabs.com/simplicity-studio



Development Kits

Priced $64–$99, these kits are the most comprehensive development option.



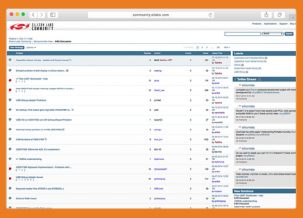
ToolStick Evaluation Kits

Priced from $9.90, these kits are the easiest and least expensive option.

10 years

Longevity Commitment

Silicon labs targets a minimum 10-year life cycle.



Silicon Labs Community

Find the support and answers you need on Silicon Labs community forum.

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